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03 April 2002  
C6-BRC-T-02-005

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
Los Angeles Region  
320 W. 4<sup>th</sup> Street, Suite 200  
Los Angeles, CA 90013



Attention: John Geroch

Subject: **SITE CLOSURE EVALUATION PARCEL B DEEP SOIL, FOR  
BOEING REALTY CORPORATION, FORMER C-6 FACILITY,  
19503 SOUTH NORMANDIE AVENUE, LOS ANGELES, CA**

Dear Mr. Geroch:

Please find enclosed for your review, a copy of the subject document prepared by  
Haley & Aldrich for Boeing Realty Corporation.

If you have any questions concerning this document, please contact the undersigned  
at 562-593-8623.

Sincerely,

Stephanie Sibbett  
Boeing Realty Corporation

Cc: Mario Stavale, Boeing Realty Corporation

enclosure

20 March 2002  
File No. 27285-003

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Fax: 619.280.9415  
www.HaleyAldrich.com



Mr. Brian Mossman  
Boeing Realty Corporation  
3855 Lakewood Blvd.  
Building 1A MC D001-0097  
Long Beach, California 90846

**Subject: Site Closure Evaluation - Parcel B Deep Soil, Boeing Realty Corporation  
(BRC) Former C-6 Facility, Los Angeles, California**

Dear Mr. Mossman:

Haley & Aldrich, Inc. (Haley & Aldrich) has conducted an evaluation for recommended closure of deep soil (vadose zone soil at depths greater than 12 feet below ground surface [bgs]) at the subject property (Parcel B). Parcel B is one of four parcels (Parcels A through D) of the BRC Former C-6 Facility, at 19503 South Normandie Avenue, in Los Angeles, California.

#### EXECUTIVE SUMMARY

BRC has completed their investigation and risk assessment evaluation of deep soil within Parcel B. These activities included:

- Investigation of the vertical and lateral extent of soil impacts
- Investigation of impacts to groundwater
- Groundwater monitoring for the presence of volatile organic compounds (VOCs)
- Preparation of risk assessment work plans
- Evaluation of the potential for adverse health effects from residual soil and groundwater impacts
- Evaluation of the potential impacts on groundwater quality from residual soil impacts

Based on the closure evaluation presented herein, it is recommended that the Regional Water Quality Control Board – Los Angeles Region (RWQCB) issue a “no further action” letter for deep soil impacts in Parcel B based on the following information and conclusions:

1. Both the vertical and lateral extent of soil impacts related to onsite operations have been delineated.
2. In a letter dated January 7, 2000 (RWQCB 2000), the RWQCB issued a letter of no further action for shallow soil in Parcel B. No known sources of VOC impacts have been discovered on Parcel B.

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3. The post-demolition risk assessment, approved by the California Department of Toxic Substances Control (DTSC), indicates that the soil at any depth, including deep soil, does not pose a risk to human health greater than the Office of Environmental Health Hazard Assessment (OEHHA)-approved levels from inhalation of VOCs by upward VOC vapor migration into onsite buildings. No other exposure pathways are considered complete for deep soil.
4. The following additional potential exposure pathways were evaluated using deep soil investigation results:
  - inhalation of VOCs in indoor air from upward VOC vapor migration from groundwater into onsite buildings, and
  - inhalation of VOCs in indoor air due to VOC migration from deep soil leachate to groundwater and subsequent upward VOC vapor migration from groundwater into indoor air.

Adding the estimated risks for Parcel B from the above-listed pathways to the risks calculated for potential onsite receptors, as presented in the post-demolition risk assessment, does not result in risks greater than OEHHA-approved risk levels for the BRC Former C-6 Facility property.

5. The existing residual chemical concentrations in onsite deep soil do not pose a threat to groundwater quality at concentrations greater than California drinking water standards.

## **1.0 BACKGROUND**

### **1.1 SITE LOCATION**

Parcel B is located within the BRC Former C-6 Facility at 19503 South Normandie Avenue, in Los Angeles, California. The approximate location of Parcel B is depicted in Figure 1. A site plan is presented as Figure 2.

### **1.2 SITE LAND USE HISTORY**

Parcel B occupies the western portion of the 170-acre Facility and is bordered by West 190<sup>th</sup> Street to the north; Parcel A, C and D to the east; Montrose Chemical and residential properties to the south; and Western Avenue, Capitol Metals, and ILM to the west (Figure 3). Aerial photographs indicate that the area was farmland before the 1940s. Industrial use of Parcel B began in 1941 when it was developed as part of an aluminum reduction plant. Prior

to 1952, the aluminum reduction plant was converted to a steel manufacturing facility. In 1952, the Douglas Aircraft Company (DAC) used the facility to manufacture aircraft and aircraft components until approximately 1992. Parcel B has been primarily used for employee parking since DAC began operating the facility in 1952 (Integrated, 1998a, references listed in Appendix A). A cluster of buildings at the center of the parcel separated the parking area into northern and southern lots. A tool and scrap storage yard serviced by railroad spur tracks occupied the southern portion of Parcel B. DAC used the buildings primarily for office space and storage. The property ownership was transferred to The Boeing Company during a merger with McDonnell Douglas Corporation in 1997. Currently, the former manufacturing facility has been demolished and Parcel B is being redeveloped for commercial/industrial use.

## **2.0 SITE INVESTIGATION RESULTS**

### **2.1 SITE INVESTIGATION HISTORY**

An evaluation of the previous investigation was conducted to assess whether the deep soil has been adequately characterized laterally and vertically for risk assessment and closure of Parcel B deep soil.

A review of the previous reports (listed in Appendix A) indicates that soil was investigated to depths of approximately 50 feet bgs. The water table is located at approximately 65 feet bgs. Two hundred twenty-nine (229) soil samples were collected within 52 borings at depths ranging between 0.5 and 50 feet bgs and were analyzed for VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), total recoverable petroleum hydrocarbons (TRPH), polychlorinated biphenyls (PCBs), pesticides, and metals. Concentrations of detected compounds are shown on Figures 4, 5, and 6. (KJC 1998, Integrated 1998a and 1999).

The Parcel B Post-Demolition Risk Assessment report (Integrated 1998b) indicates that metals concentrations measured in onsite soil samples are within natural background levels, with the exception of arsenic. Arsenic was detected above natural background levels in two soil samples, sample 5-4-40\_P\_40\_030597\_1 collected from 40 feet bgs and sample AOI4-EV1 @ 51' \_P\_51\_070298\_1 collected from 51 feet bgs.

Organic chemicals detected in deep soil samples from Parcel B include:

- Bis(2-ethylhexyl)phthalate
- 1,1-Dichloroethene (1,1-DCE)
- Napthalene
- Tetrachloroethene (PCE)

- Toluene
- Trichloroethene (TCE)
- Petroleum hydrocarbons (as total recoverable petroleum hydrocarbons [TRPH], e.g., heavier carbon-chain organics such as motor oil)

Organic chemicals detected in groundwater beneath Parcel B include:

- Benzene
- Carbon disulfide
- Carbon tetrachloride
- Chloroform
- 1,1-Dichloroethane (1,1-DCA)
- 1,1-DCE
- cis-1,2-Dichloroethene
- Ethylbenzene
- Isopropyl benzene
- Methylene chloride
- Methyl ethyl ketone (2-butanone)
- PCE
- Toluene
- TCE
- 1,2,4-Trimethylbenzene
- Vinyl chloride
- Xylenes
- Bis(2-ethylhexyl)phthalate

Review of the concentrations for the soil samples indicate that the reported chemical concentrations related to releases originating from Parcel B operations appear to be adequately delineated both vertically and horizontally as shown in Figures 4, 5 and 6. RWQCCB concurred in a letter dated January 7, 2000 (RWQCB 2000), stated that "Boeing adequately assessed and characterized potential soil impacts from chemicals at the site."

## 2.2 CHEMICALS OF POTENTIAL CONCERN

Calculation of human health risk and evaluation of threat to groundwater quality requires identification of the chemicals of potential concern (COPCs). COPCs were identified as those chemicals that could pose a human health risk due to vapor migration into buildings or a threat to groundwater quality at concentrations above drinking water standards. The COPCs for soil and groundwater are presented below, along with their maximum detected onsite concentrations.

#### Soil

• Arsenic	25 milligrams per kilogram (mg/kg)
• Bis (2-ethylhexyl) phthalate	4.4 mg/kg
• 1,1-DCE	0.044 mg/kg
• PCE	0.0050 mg/kg
• TCE	0.170 mg/kg
• Toluene	0.0030 mg/kg

#### Groundwater

• Benzene	0.00081 milligrams per liter (mg/l)
• Carbon disulfide	0.370 mg/l
• Carbon tetrachloride	0.0015 mg/l
• Chloroform	0.0051 mg/l
• 1,1-DCA	0.00035 mg/l
• 1,1-DCE	0.00058 mg/l
• cis-1,2-Dichloroethene	0.012 mg/l
• Ethylbenzene	0.00023 mg/l
• Isopropyl benzene	0.00032 mg/l
• Methylene chloride	0.006 mg/l
• MEK	0.0056 mg/l
• PCE	0.025 mg/l
• Toluene	0.017 mg/l
• TCE	10 mg/l
• 1,2,4-Trimethylbenzene	0.00043 mg/l
• Vinyl chloride	0.0030 mg/l
• Xylenes	0.0014 mg/l

These data were used to complete the human health and groundwater impact assessment for Parcel B deep soil. It should be noted that the potential health risks associated with TRPH are assessed according to their toxic components (e.g. PAHs and aromatic hydrocarbons such as benzene).

### **3.0 HUMAN HEALTH RISK ASSESSMENT**

Risk assessments have been performed to evaluate if chemicals present at Parcel B pose a human health risk above OEHHA-approved risk levels. A post-demolition risk assessment was performed in 1998 (Integrated, 1998a) and risk assessment calculations were performed

as part of this evaluation for Parcel B. A brief summary of the post demolition risk assessment is provided, followed by a discussion of the human health risk assessment calculations performed for this report.

### **3.1 HISTORICAL RISK ASSESSMENTS**

A post-demolition risk assessment was conducted in 1998 to evaluate "the health protectiveness of post-demolition site conditions" (Integrated 1998b). The analytical results of the soil samples were compared to health-based remediation goals (HBRGs) for the BRC Former C-6 Facility property (Integrated 1997). The HBRGs were used as screening levels to identify areas likely requiring remedial excavation. This data comparison indicated that no areas on Parcel B were found to contain chemicals at levels that warranted remediation (KJC 1998, Integrated 1998a and 1999). The RWQCB confirmed in a letter dated January 7, 2000, that no further action is required for the Parcel B shallow soil (0 to 12 feet bgs). The California Human and Ecological Risk Division (HERD) further indicated in their March 9, 1999 memo that it agreed with the conclusion in the post-demolition risk assessment that residual shallow and deep soil impact risks "fall within a range of values that HERD determines to be acceptable for the proposed land use and will not pose significant health risks for future site occupants."

Although an evaluation of human health risks from potential exposure to deep soil impacts was performed and indicated no significant health risks, an evaluation of risk associated with existing or potential future groundwater concentrations due to migration of residual deep soil impacts was not performed. Therefore, no deep soil closure was issued. To address these risk issues, a supplemental assessment was performed.

### **3.2 SUPPLEMENTAL HUMAN HEALTH RISK ASSESSMENT**

A review of the post-demolition risk assessment (Integrated 1998b) indicated that the following two human health exposure pathways associated with existing and potential future groundwater impacts were not considered:

- inhalation of VOCs in indoor air from upward VOC vapor migration from groundwater into onsite buildings, and
- inhalation of VOCs in indoor air due to VOC migration from deep soil leachate, migration to groundwater, and subsequent VOC vapor migration from groundwater into indoor air.

No other additional exposure pathways are considered complete for deep soil. Thus, the above-noted potential exposure pathways not previously addressed in the post-demolition risk assessment were evaluated and summarized herein.

The risk assessment calculations are described in Appendix B, and the results are presented in Appendices B and C. Adding the estimated risks from the above-listed pathways (risk assessment modeling output presented in Appendix C) to the potential onsite receptor risks presented in the post-demolition risk assessment do not result in risks greater than the OEHHA-approved risk levels.

#### **4.0 POTENTIAL THREAT TO GROUNDWATER ASSESSMENT**

The post-demolition risk assessment did not consider the potential threat to groundwater due to chemical leaching from deep soil impacts. Thus, potential degradation of groundwater quality due to chemical leaching from deep soil to groundwater was evaluated and summarized herein.

Results of our evaluation (detailed in Appendix B) indicate that leaching of maximum COPC concentrations in deep soil of Parcel B would not result in potential groundwater concentrations that are greater than MCLs, with the exception of TCE. In addition, measured concentrations of TRPH are less than their residual saturation concentration of 14,000 mg/kg in onsite soil (assumed to be silty sand) and, therefore, do not pose a threat of free product generation on the groundwater table.

For TCE, a comparison between estimated maximum TCE concentrations in groundwater, due to chemical leaching to groundwater, and measured TCE concentrations in groundwater was conducted to assess whether the existing TCE concentrations in soil may further degrade existing groundwater quality. The RWQCB acknowledged in their January 7, 2000 letter (RWQCB, 2000) that groundwater beneath Parcel B had been impacted by VOCs originating from off-site sources. No known sources of VOC impacts have been discovered on Parcel B. Thus, the TCE concentrations in deep soil and groundwater in this area appear to have originated from the ILM site west of Parcel B (Figure 4). Figure 7 presents a summary of the TCE concentrations in groundwater beneath Parcel B.

As discussed in Appendix B, the estimated maximum groundwater concentration resulting from migration of potential onsite TCE-impacted soil leachate is over seven hundred times less than the most recently measured maximum TCE concentration in the groundwater (10 mg/l). This groundwater sample was collected from monitoring well DAC-P1 which is situated closest to the boring (2BB-1A-6) with the greatest onsite soil concentration of TCE (0.170 mg/kg). Groundwater beneath and in proximity to Parcel B will not likely be used for



domestic water supply purposes. Therefore, based on these calculations and information, the existing residual chemical concentrations in onsite deep soil do not pose a further threat to groundwater quality.

## 5.0 SUMMARY AND CONCLUSIONS

Based on the closure evaluation presented herein, it is recommended that no further action be granted by the RWQCB for deep soil impacts at Parcel B based on the following information and conclusions.

1. A review of the results of the deep soil investigation activities conducted at Parcel B from 1991 through 1998 indicates that both the vertical and lateral extent of soil impacts from releases originating from Parcel B operations have been delineated. Relatively low concentrations of bis(2-ethylhexyl)phthalate, naphthalene, 1,1-dichloroethene, tetrachloroethene, toluene, trichloroethene, and TRPH have been detected in onsite soil between depths of 12 and 50 feet bgs. Elevated concentrations of TCE have been detected in onsite deep soil at depths between 40 and 50 feet bgs and in groundwater. Other chlorinated VOCs have also been detected in onsite groundwater. However, no source of these chemicals originating from Parcel B operations has been identified. Chlorinated VOCs have been detected in groundwater migrating from the ILM site onto Parcel B. Thus, it appears that the concentrations of chlorinated VOCs detected in deep onsite soil samples may be attributed to chemical migration from the ILM site west of Parcel B.
2. In a letter from the RWQCB dated January 7, 2000, the RWQCB stated that "Boeing adequately assessed and characterized potential soil impacts from chemicals at the site".
3. Parcel B risk assessment guidelines were developed in the document entitled *HBRGs for Surface Soils* (Integrated, 1997) and results of the initial post-demolition risk assessment are included in the Parcel B Post-Demolition Risk Assessment report (Integrated 1998).
4. In a memo dated March 9, 1999, the HERD indicated that it agreed with the conclusion in the post-demolition risk assessment that residual shallow and deep soil impacts in Parcel B do not pose health risks greater than acceptable levels. The potentially complete exposure pathway identified in the post-demolition risk assessment for deep soil included possible inhalation of vapors that have migrated from soil into buildings. Estimates of human health risk from this exposure pathway were calculated using VOC concentrations detected throughout the soil column, including deep soil. The post-demolition risk assessment (Integrated 1997) indicates that the soil does not pose a risk to human health

greater than acceptable levels from inhalation of VOCs from upward VOC vapor migration into onsite buildings.

5. The following additional potential exposure pathways were evaluated using deep soil investigation results:

- inhalation of VOCs in indoor air from upward VOC vapor migration from groundwater into onsite buildings, and
- inhalation of VOCs in indoor air due to VOC migration from deep soil leachate to groundwater and subsequent upward VOC vapor migration from groundwater into indoor air.

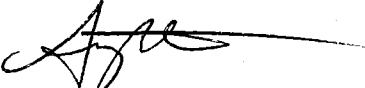
Adding the estimated risks from the above-listed pathways to the risks calculated for potential onsite receptors, as presented in the post-demolition risk assessment, do not result in risks greater than the OEHHA-approved risk levels for the BRC Former C-6 Facility property.

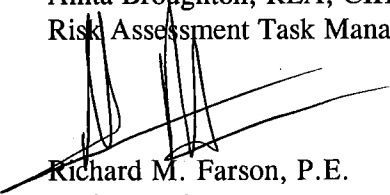
6. The existing residual chemical concentrations in onsite deep soil do not pose a threat to groundwater quality at levels greater than MCLs, with the potential exception of TCE. Only three samples collected at a depth of 40 and 50 feet bgs, adjacent to the ILM site, contain TCE concentrations that could further contribute to groundwater concentrations above the MCL. Concentrations of TCE in deep soil and groundwater in this portion of Parcel B appear to have originated from the ILM site. Comparison of the estimated maximum TCE concentrations in groundwater, due to chemical leaching to groundwater, to measured TCE concentrations in groundwater indicates that existing TCE concentrations in soil will not further degrade existing groundwater quality.


Boeing Realty Corporation  
20 March 2002  
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If you have any questions regarding the content of this letter, please contact either of the undersigned at (619) 280-9210.

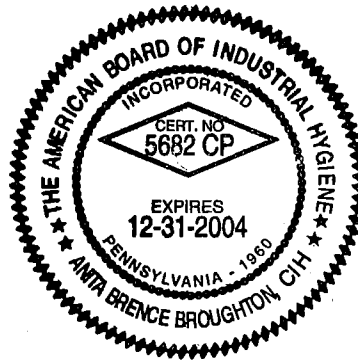
Sincerely yours,  
HALEY & ALDRICH, INC.

  
Anita Broughton, REA, CIH  
Risk Assessment Task Manager

  
Richard M. Farson, P.E.  
Senior Engineer

  
Scott Zachary  
Project Manager

Attachments



## List of Attachments

Figure 1	Parcel B Location Map
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Table B-9	Summary of Cumulative Risks
Appendix C	Vapor Migration Model Results

